CLAIMS

1. An abnormality monitoring apparatus in a load drive circuit which includes a converter for performing at least one of an operation for increasing a voltage and an operation for decreasing a voltage, and a battery connected to an input side of the converter, the converter supplying electric power to a load, the abnormality monitoring apparatus being characterized by comprising:

first detecting means for detecting a voltage value of the battery;

second detecting means for detecting a voltage value on an output side of the converter;

battery voltage estimating means for calculating an estimated voltage value of the battery;

calculating means for calculating at least one of the difference value between the voltage value detected by the first detecting means and the estimated voltage value, and the difference value between the voltage value detected by the second detecting means and the estimated voltage value; and

monitoring means for monitoring at least one of an abnormality of the first detecting means and an abnormality of the second detecting means based on each of the difference values and a predetermined threshold value.

2. The abnormality monitoring apparatus according to claim 1, wherein the monitoring means includes abnormality detecting means for detecting an abnormality of the first detecting means based on an absolute value of the difference between the voltage value of the battery detected by the first detecting means and the estimated voltage value in a case where the converter is performing the operation for increasing the voltage or the operation for decreasing the voltage.

3. The abnormality monitoring apparatus according to claim 1, characterized by further comprising control means for controlling the converter such that the converter stops the operation for increasing the voltage or the operation for decreasing the voltage when an abnormality of the first detecting means is tentatively detected in a case where the converter is performing the operation for increasing the voltage or the operation for decreasing the voltage, wherein the monitoring means includes determining means for determining abnormal detecting means from among the first detecting means and the second detecting

means based on an absolute value of the difference between the voltage value of the battery detected by the first detecting means and the estimated voltage value, and an absolute value of the difference between the voltage value detected by the second detecting means and the estimated voltage value when the converter stops the operation for increasing the voltage or the operation for decreasing the voltage.

4. The abnormal monitoring apparatus according to any one of claims 1 to 3, characterized by further comprising electric current value detecting means for detecting an electric current value of the battery, wherein the battery voltage estimating means includes estimated voltage value calculating means for calculating the estimated voltage value based on an electric power command value indicating a value of electric power supplied to the load and the electric current value of the battery.

5. The abnormal monitoring apparatus according to claim 4, wherein the battery voltage estimating means includes estimated voltage value learning calculating means for learning and calculating the estimated voltage value.

6. The abnormal monitoring apparatus according to any one of claims 1 to 5, wherein the monitoring means includes abnormality monitoring means for monitoring an abnormality of at least one of the first detecting means and the second detecting means by continuing to monitor an abnormal state of at least one of the first detecting means and the second detecting means for a predetermined time or more.

7. An abnormality monitoring method in a load drive circuit which includes a converter for performing at least one of an operation for increasing a voltage and an operation for decreasing a voltage, and a battery connected to an input side of the converter, the converter supplying electric power to a load, the abnormality monitoring apparatus being characterized by comprising the steps of:

detecting a voltage value of the battery;

detecting a voltage value on an output side of the converter;

calculating an estimated voltage value of the battery;

calculating at least one of the difference value between the detected voltage value of the battery and the estimated voltage value, and the difference value between the detected voltage value on the output side of the converter and the estimated voltage value; and

monitoring at least one of an abnormality of detection of the voltage value of the battery and an abnormality of detection of the voltage value on the output side of the converter based on each of the difference values and a predetermined threshold value.